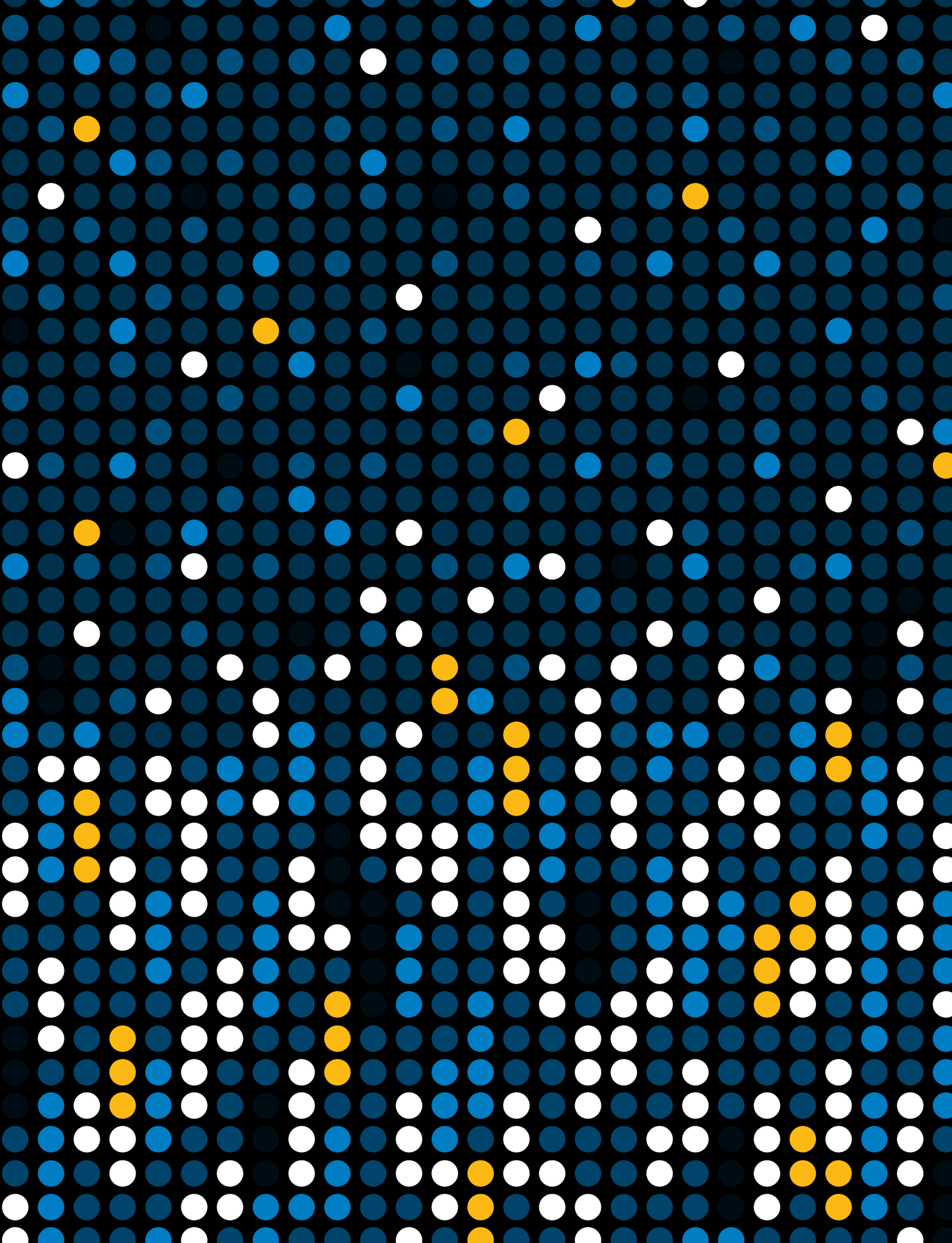
BD FACSJazz™

BD

Helping all people live healthy lives

Breathtaking Solo Performance



Breathtaking Solo Performance

The BD FACSJazz™ signals a new era in cell sorting with dependable BD performance, but with a benchtop fit and an affordable price.

The BD FACSJazz cell sorter incorporates design features that simplify operation of stream-in-air cell sorters, to increase the operational efficiency of labs with high workloads, making the most commonly used sorting applications accessible to researchers with limited flow cytometry experience. The key features include factory-optimized settings, intuitive alignment, real-time video monitoring, and BD FACS™ Accudrop technology.

Requiring less than 2 x 2 ft (20 x 20 in, 51 x 51 cm) of bench space, the BD FACSJazz is an easy fit in a core facility or an individual lab. The power supply, electronics, and fluid tanks are placed below the lab bench to allow the instrument to occupy a reduced footprint or be installed easily in a biological safety cabinet (BSC).

The BD FACSJazz can be configured with up to three lasers and eight parameters to support application requirements for individuals and core labs. In a core lab, the BD FACSJazz can offload sorting demand and free high-end sorters by handling routine applications such as cloning. The system has also been designed to meet the needs of individuals for applications such as single-cell analysis, which are driving the accelerated pace of genomics and next-generation sequencing.

To simplify setup and training, the BD FACSJazz runs with factory-optimized settings. It comes with BD FACS™ Sortware, an innovative software application specifically designed for comprehensive instrument control during acquisition, sorting, and analysis.

Innovations and Fail-Safes Deliver Stability from Day to Day, All Day

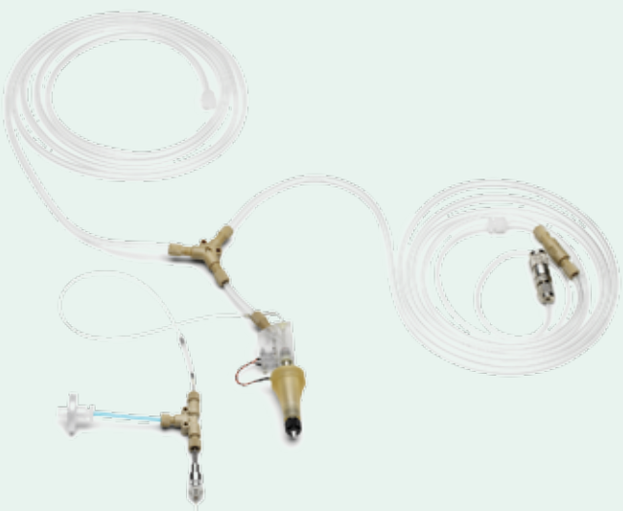
Based on extensive experience developing and supporting high-speed cell sorters, the BD FACSJazz delivers operational efficiency and high performance. The stability of the fluidics system provides reliable sorting performance from day to day, all day long. A number of system features ensure a trouble-free sorting experience—empowering quick and easy sort setup and operation.

Acoustical Coupling in the Nozzle Assembly
The fluidics system in the BD FACSJazz uses a highly efficient acoustical coupling in the nozzle assembly to create stable droplets at a moderate sheath pressure. These settings optimize cell viability, which can be critical to maximizing cell yield from sorting. To further ensure simple operation, the BD FACSJazz fluidics system has been designed without in-line valves or components in the sheath and sample fluidic path.

Novel Pressure Console and Software Control
A novel pressure console design uses digital sensors to control pressure. The pressure console is integrated with BD FACS Sortware software to control all fluidics functions. The software automates basic functions for sample loading, and coordinates functions such as opening valves, boosting, and running the sample to start a sorting experiment. When the BD FACSJazz is in a biological safety cabinet, this comprehensive software control enables the operator to remotely control the fluidic functions, minimizing the operator's direct interactions with the cytometer.

Nozzle Assembly
The nozzle tip is mechanically coupled to the system using a threaded nut, allowing the tip to be removed for cleaning without grossly impacting system alignment. This allows researchers to have greater control with greater ease of use.

Exchangeable fluidics
An important concern in cell sorting is cross-contamination, either between samples or with foreign biological agents such as bacteria, viruses, and DNA. To mitigate the risk of cross-contamination, the sample path is free of in-line valves to minimize contact between cells and non-replaceable parts. For absolute and rigorous control, the complete fluidics path, including all parts that potentially contact cells, can be replaced with a disposable fluidics kit.



Streamlined Operation
To simplify operator experience, the 100-micron nozzle tip can be easily removed and replaced. In addition, other fail-safe features in the fluidics system also help enable a simplified operator experience. This includes a bubble detector built into the fluidics system to automatically stop the flow when a sample tube is empty to prevent air bubbles from reaching the nozzle and compromising sort performance. Simple keyboard shortcuts such as sample, boost, and run, enable keyboard control of the fluidics system to further simplify operation.

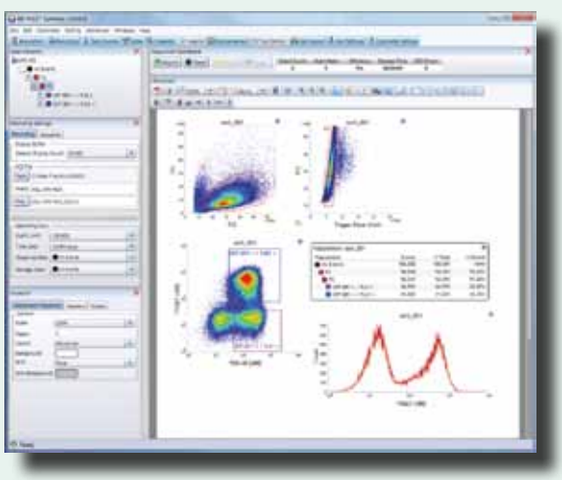
Sheath and Waste Tanks
The BD FACSJazz is equipped with 7-L stainless steel sheath and waste tanks. When instruments are used with BSCs, the tanks may be located outside the containment area. The waste tank remains sealed under vacuum and does not generate aerosols. Bleach can be added to the waste tank to inactivate biological materials to ensure that they do not pose a risk to operators.

Pressure Console controls

Murine stem cell development progression
BD FACSJazz analysis of murine stem cells expressing GFP with Flk1 reveals three distinct cell populations, $GFP^{-}Flk1^{-}$, $GFP^{+}Flk1^{-}$ and $GFP^{+}Flk1^{+}$cells, which represent a developmental progression ranging from pre-mesoderm to pre-hemangioblast mesoderm to the hemangioblast.

GFP expression is a marker for mesoderm. Antibody used was Flk1 $PE{\cdot}Cy7$.

Data courtesy of Valerie Kouskoff, Stem Cell Haematopoiesis Group, Cancer Research UK, Paterson Institute for Cancer Research, The University of Manchester, England.



Factory-Optimized Settings and Intuitive Controls

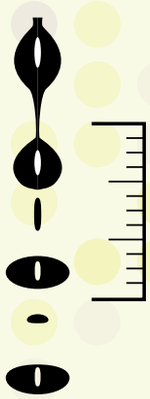
The compact optical bench features reduced-footprint lasers, steering optics, and custom-built lens holders to enable the BD FACSJazz to support a wide range of applications. The cytometer uses just a few controls that can be easily learned and managed. The simplified optical layout allows easy alignment while providing the stability necessary for high-sensitivity measurements, without the need for frequent adjustments.

Inside view of lasers and laser steering module

Up to Three Lasers for Support of Six Colors
The BD FACSJazz uses advanced lasers to achieve performance in a benchtop fit. Up to three lasers can be selected, including a standard blue laser and optional red and violet lasers for a maximum of six supported colors from two- or three-laser configurations. Independent laser focusing lenses make multi-laser alignment straightforward and precise.

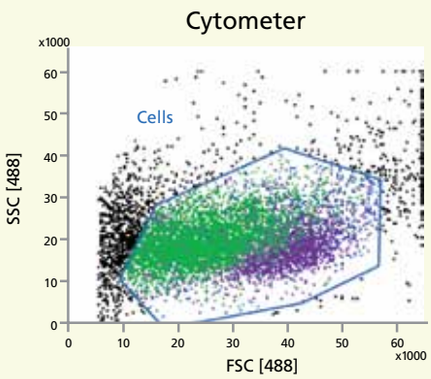
A Wide Range of Fluorophores Supported
Researchers can choose a laser configuration based on the fluorophores that will be used. The blue laser supports FSC, SSC, FITC/GFP, PE, PerCP-Cy™5.5, and PE-Cy™7; the red laser supports APC and APC-Cy7; and the violet laser supports BD Horizon™ V450, Brilliant Violet 421, DAPI, and BD Horizon™ V500. See the BD FACSJazz Filter Guide for a complete list of system configurations and filter specifications. Lasers can be added or changed onsite if future requirements change.

Collection optics filters precisely match the lasers and fluorophores in the BD FACSJazz configuration. Careful selection of lasers and filters simplifies compensation and instrument operation.



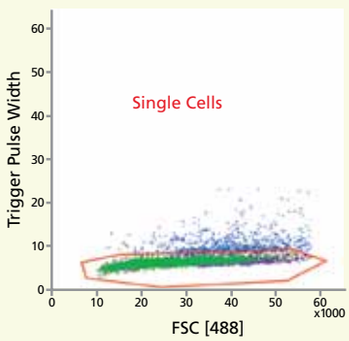
Stream breakoff
The BD FACSJazz charges drops containing the cells of interest at the precise moment that they break off from the fluid jet stream, deflecting them into a collection device. This illustration visualizes breakoff as seen from the pinhole camera view.

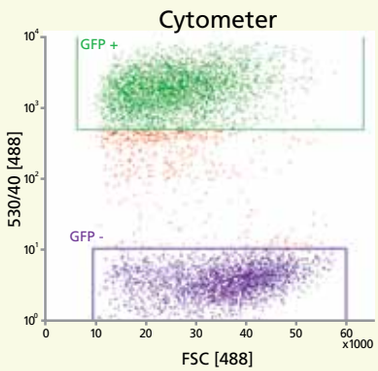
Adipose-derived stem cell GFP expression profiling
Adipose-derived stem cells expressing GFP were co-cultured with pancreatic tumor cells and run on the BD FACSJazz. The GFP-positive cells were sorted at 6,000 cells per second in 1.5 drop pure mode and collected into 15-mL tubes.



Simplified System Alignment
Most alignment controls are fixed to simplify lens positioning in the BD FACSJazz. For example, to achieve a consistent laser spot size on the stream, the distance of the lens-focusing element to the stream is fixed.

Pinhole Camera View
The patented optical design uses a special pinhole camera to image the stream and the pinholes simultaneously, simplifying optical alignment. With the help of the pinhole camera, near-optimal alignment can be achieved within seconds without using beads.





Populations: Cytometer

Populations	Events	% Total	% Parent
All Events	10,000	100.00%	####
Cells	8,628	86.28%	86.28%
Single Cells	7,856	78.56%	91.05%
GFP -	3,040	30.40%	38.70%
GFP +	4,352	43.52%	55.40%

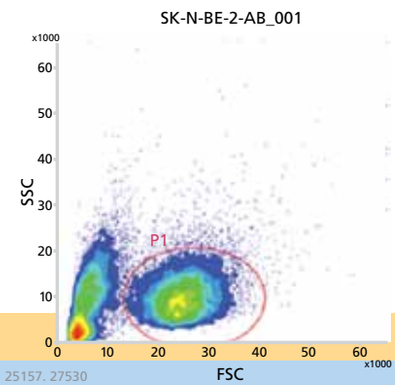
Pre-Selected Sort Settings Minimize Setup, Maximize Consistency

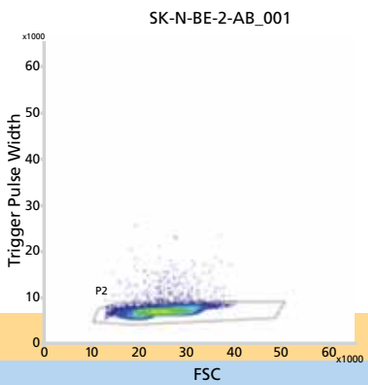
Traditionally, sorter operators select and fine-tune many sorting parameters over a large range of settings. With the BD FACSJazz, most of the sorting parameters, such as the sheath pressure and drop drive frequency, are pre-selected to minimize sort setup steps while maximizing sort performance and consistency.

Patented BD FACS Accudrop Technology
BD FACS Accudrop technology further simplifies setup and eliminates manual calculations otherwise required for drop-delay determination. Accurately setting the drop-delay while sorting BD FACS™ Accudrop beads ensures that the instrument precisely places the charge on the drop containing the particle of interest.

Removable Deflection Plates
As particles enter the sort chamber, high-voltage deflection plates in the BD FACSJazz deflect charged droplets into a collection device. The unique, modular design of the plates enables easy removal if cleaning is needed.

Removable deflection plates





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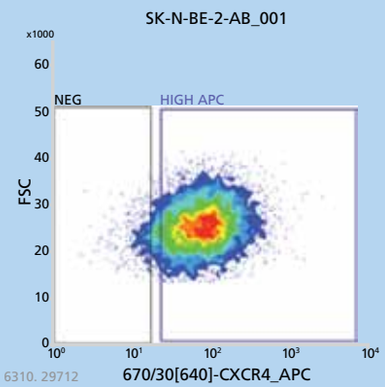

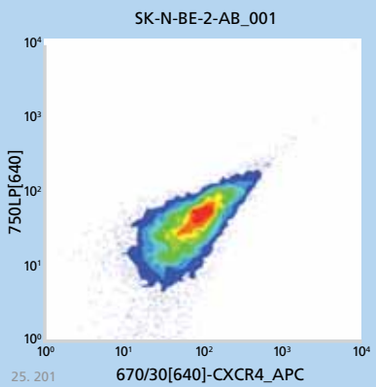

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Human neuroblastoma cell line sorting
SK-N-BE 2 human neuroblastoma cells were analyzed for the expression of CXCR4 cell surface receptor using an APC-labeled antibody and run on a BD FACSJazz. Cells were sorted based on staining brightness (low, medium, and high) in 1.5 drop pure mode at a rate of 3,500 events per second. A purity check of the bright staining cells shows greater than 98% purity.

Data courtesy of Christopher Brownlee, Flow Cytometry Facilities Manager, Biological Resources Imaging Laboratory, The Mark Wainwright Analytical Centre, University of New South Wales, Sydney, Australia.

Samples courtesy of Dr. Jamie Fletcher and Mr. Ben Wilkinson, Childrens Cancer Institute Australia, Lowy Cancer Research Centre, UNSW, Sydney NSW 2052

Populations: *SK-N-BE-2_AB_001*

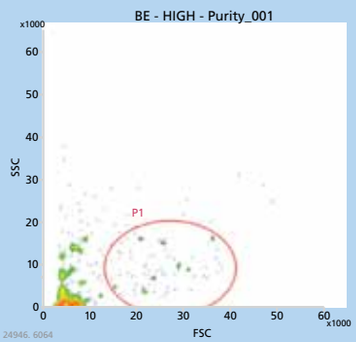
Populations	Events	% Total	% Parent
All Events	20,000	100.00%	####
P1	10,362	51.81%	51.81%
NEG	349	1.74%	3.37%
P2	10,287	51.43%	99.28%
HIGH APC	9,225	46.12%	89.68%

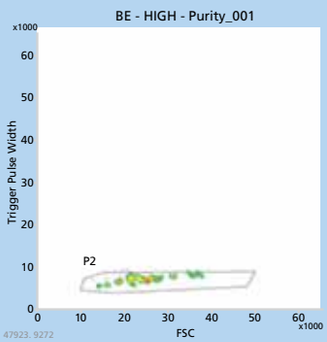
Collection Formats Support Application Needs, Including Cloning and Single-Cell Analysis

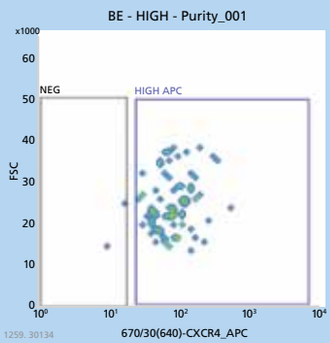
The BD FACSJazz supports two-way sorting and a variety of different collection formats. These include support for 5-mL tubes and 15-mL tubes, as well as 96- and 384-well plates, slides, Petri dishes, Terasaki plates, or other custom collection devices. The automated deposition unit enables fast, precise motion control to effectively support cloning applications and single-cell analysis. The automated cell disposition unit can be removed for cleaning.

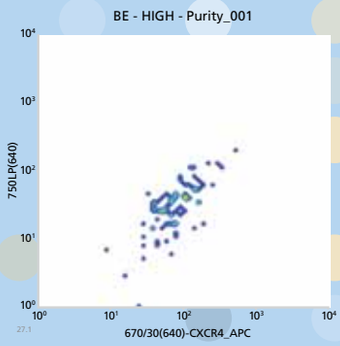
A Clear View of the Sort Chamber

With the BD FACS™ Accudrop laser located behind the stream and protected from view, clear sort chamber doors allow easy viewing of the sort path. Live video feed of waste collection, the side streams, and the sort stream breakoff point enables real-time viewing of the sort in process to further simplify use.









Populations: BE - HIGH - Purity_001

Populations	Events	% Total	% Parent
All Events	276	100.00%	####
P1	66	23.91%	23.91%
NEG	1	0.36%	1.52%
P2	65	23.55%	98.48%
HIGH APC	64	23.19%	98.46%

Utilizing BD FACS Sortware Designed with You in Mind

BD FACS Sortware sorter software is the first software specifically created to support cell sorters. The software provides comprehensive control of the cell sorter from configuration and compensation setup to acquisition, sorting, and analysis.

A Better Level of Control

The software makes it easy for researchers to control the instrument. When the BD FACSJazz is in a BSC, this comprehensive software control enables the operator to remotely control essential functions such as starting or stopping the fluidics to minimize direct interaction with the instrument.

To maximize reproducibility and accelerate experimental studies, researchers can save and recall previous configurations, instrument states, and parameter settings. A multitasking capability allows researchers to sort cells from a sample, record the information in a data file, and work with a previous data file—all at the same time.

Intuitive Workflow

BD FACS Sortware software's simple, intuitive workflow, and its familiar Windows® interface, allow researchers to focus on their experiment rather than on commands and dialog boxes. Researchers can perform cytometer setup, compensation, data acquisition, gating, analysis, and sorting progressively—or they can choose to return to any step for instant adjustment.

Software controls assist researchers to classify cell populations, perform compensation, monitor sorting, and analyze results. A hierarchical gating structure also makes it easy and intuitive to classify cell populations. In addition, sort controls and event counters are used to monitor sorting, with the ability to pause, resume, reset, and stop the sort streams individually or all at once.

Data and sort analysis tools provide robust, real-time statistics on cell populations and sorting quality control at the individual cell level.

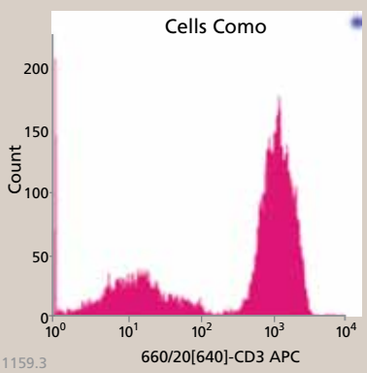
Powerful, Intuitive Analysis

To support analysis, BD FACS Sortware lets researchers visualize data from experiments in a variety of rich output formats including histograms; overlay histograms; and dot, density, and contour plots—all with linear, log, or bi-exponential (logicle) scaling.

Graphical data and text can be exported into standard productivity software with drag and drop ease of use for presentation or publication. Results can also be exported and imported as FCS (flow cytometry standard) data files for use with other software applications.

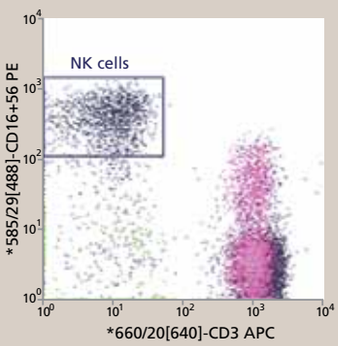
Six-color immunophenotyping

Human peripheral blood lymphocytes stained with six cell-surface markers analyzed with BD FACS Sortware (BD FACSJazz with 488-nm, 640-nm, and 405-nm lasers).



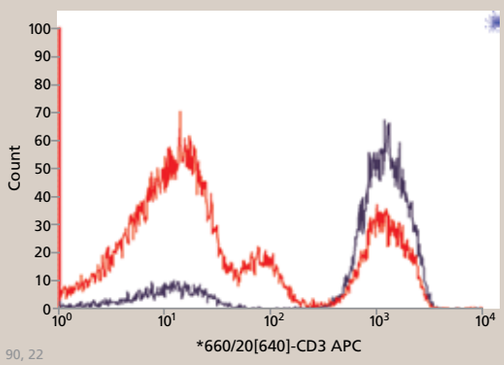
Histogram

Histograms show cell counts for a single scatter or fluorochrome variable.



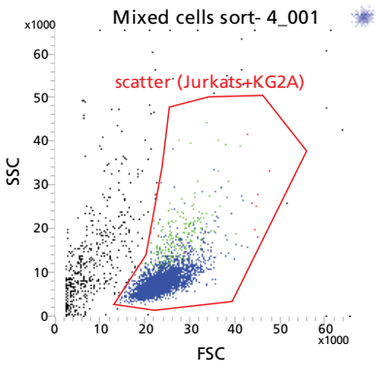
Dot plot

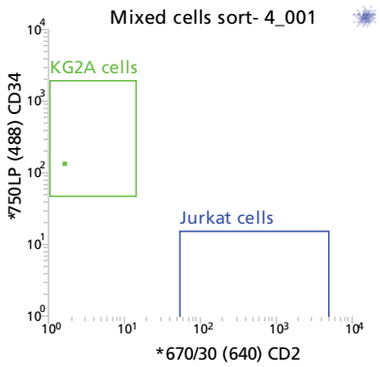
Dot plots show two variables plotted against each other, useful for identifying subpopulations.

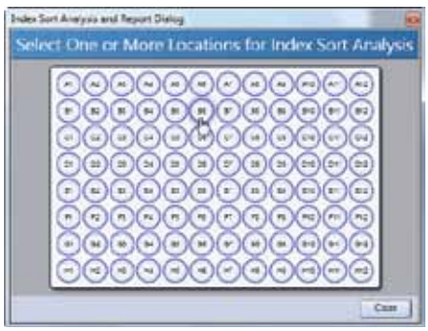


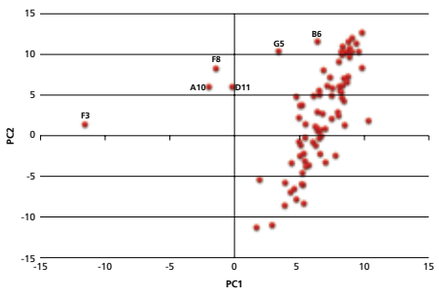
Overlay histogram

Overlay histograms show cell counts for a variable, such as fluorescence, for multiple subpopulations.







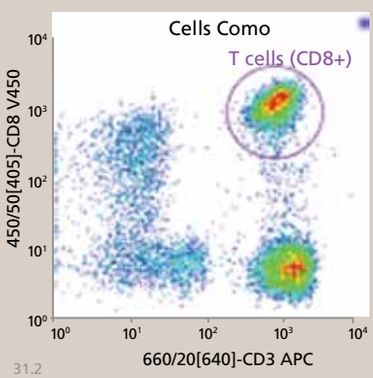


Flow phenotype correlated with gene expression utilizing index sorting
Eighty four single cells were selected at random to be sorted into a 96-well plate, with a BD FACSJazz, from an unequal mixed population of two cell lines, KG2A and Jurkat, while simultaneously capturing and recording their surface marker staining. Using the index sort feature of BD FACS Sortware, the surface phenotype of a single cell in any well coordinate can be referenced. Subsequent single cell analysis for gene expression (using the Fluidigm Biomark™ HD gene expression platform) for the 84 single cells demonstrated exact correlation between cell types predicted by both technologies. There are 6 single KG2A cells and 78 single Jurkat cells (well locations indicated).

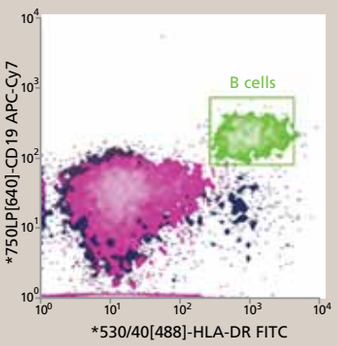
Antibodies used were CD2 APC and CD34 PE-Cy7.

Gene expression data 96 simultaneous gene expression targets for each cell courtesy of Fluidigm Corporation, South San Francisco, CA, USA.

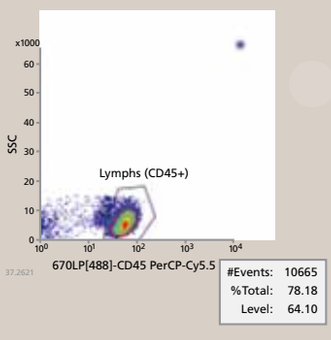
Make Exploratory Cloning More Efficient with Index Sorting
Index sorting functionality has been completely re-written and extended to put a very powerful analytical technique in the hands of researchers. It is now possible to review the complete flow phenotype of every cell sorted into a multi-position sort device, such as a 96-well tray. Index sort mode creates an FCS file containing all the sort deposition information and tray position information on an event-by-event basis. Each sorted event in the file is "indexed" one-by-one according to the X and Y coordinates of the sort collection device. Post-sorting results can be precisely traced back to the flow characteristics of the specific cell or combinations of cells sorted.



Density plot
Density plots show two variables plotted against each other using color to illustrate heavily concentrated events.



Contour plot
Like density plots, contour plots show two variables plotted against each other, but instead use topographic lines to show the boundaries of populations.



Analysis of contour plot
Employ topographic lines to define subpopulations or move the cursor over a topographic line for instantaneous subpopulation statistics.

Baker Company Custom Cabinet Meets Biosafety Standards

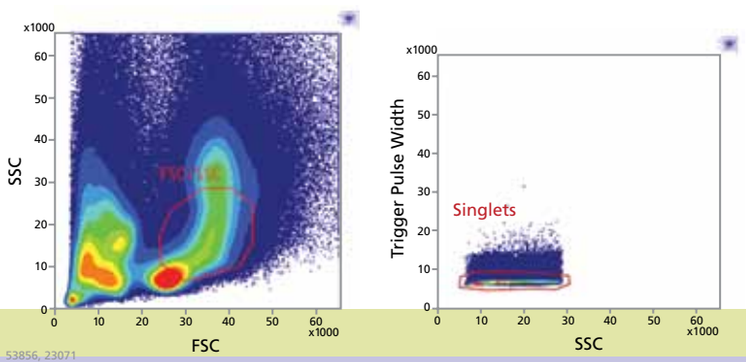
A biological safety cabinet (BSC) designed specifically for the BD FACSJazz by The Baker Company, measuring 53.75 x 34.5 x 91.87 to 98.37 in. (136.5 x 87.6 x 233.36 to 249.87 cm), is available as an option. Biological safety in flow cytometry is an emerging requirement for core laboratories concerned about the potential accidental exposure of operators to biological samples.

Protecting Personnel, Products, and the Environment
BSCs are designed to protect operators from risks associated with exposure to biological agents in samples. These cabinets are among the most effective and commonly used primary containment devices in laboratories working with infectious agents. BSCs protect personnel and the environment from harmful agents and protect product (cells) from contamination.

Verified to Meet Biosafety Standards
The Baker Company has verified that the BSC designed specifically for the BD FACSJazz meets personnel and product protection standards for both a Class II Type A2 biosafety cabinet and the National Sanitation Foundation International Standard 49. Importantly, all microbiological testing was performed with the BD FACSJazz placed inside the work area of the BSC to validate performance in an as used condition.

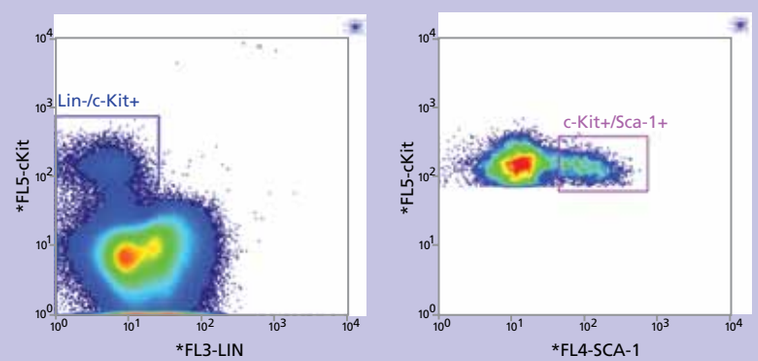
Airflow Control
The BSC controls the direction, volume, and speed of airflow to direct potentially harmful particles away from the operator. Air is filtered and circulated around the work surface, and a separate airflow at the front of the cabinet creates a protective barrier for the operator.

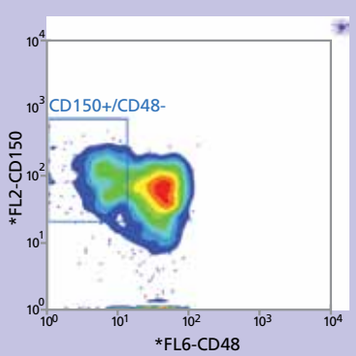
Aerosols from the BD FACSJazz sort chamber are directly evacuated into the high efficiency particulate air (HEPA) filters of the BSC, eliminating the need for an aerosol management option. The HEPA filters remove micro-organisms and airborne particulates (aerosols) from the air. Filters are placed where the air enters and exits the work area. Filters are placed where a percentage of the air is exhausted from the cabinet and where the cabinet air is recirculated. HEPA filters in the cabinet support the removal of a minimum of 99.97% of particles or equivalent with a diameter of 0.3 µm.

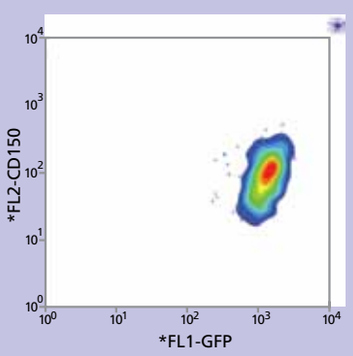


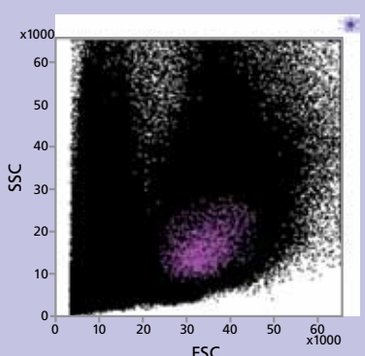
Isolation of single hematopoietic stem cells from murine bone marrow
Hematopoietic stem cells were identified in the bone marrow of a mouse expressing eGFP under the actin promotor. Sequential gating by scatter, then of singlets, lineage$^-$/c-kit$^+$, Sca-1$^+$, and CD150$^+$/CD48$^-$ events was used to deposit single GFP$^+$ HSCs into 72-well Terasaki plates with the BD FACSJazz in 1.0 drop purity mode at a rate of 1,200 cells per second. The final plot shows the lineage$^-$/c-kit$^+$/Sca-1$^+$ cells back gated on the FSC vs SSC plot.

Antibodies used were CD150 PE, Lineage PerCP-Cy5.5, Sca-1 PE-Cy7, and c-Kit APC and CD48 APC-Cy7.









Statistics: Murine Bone Marrow

Populations	Events	% Total	% Parent
All Events	1,610,538	100.00%	###
FSC/SSC	409,130	25.40%	25.40%
Singlets	400,739	24.88%	97.95%
Lin-/c-Kit+	8,288	0.51%	2.07%
cKit+/Sca-1+	1,747	0.11%	21.08%
CD150+/CD48-	469	0.03%	26.85%

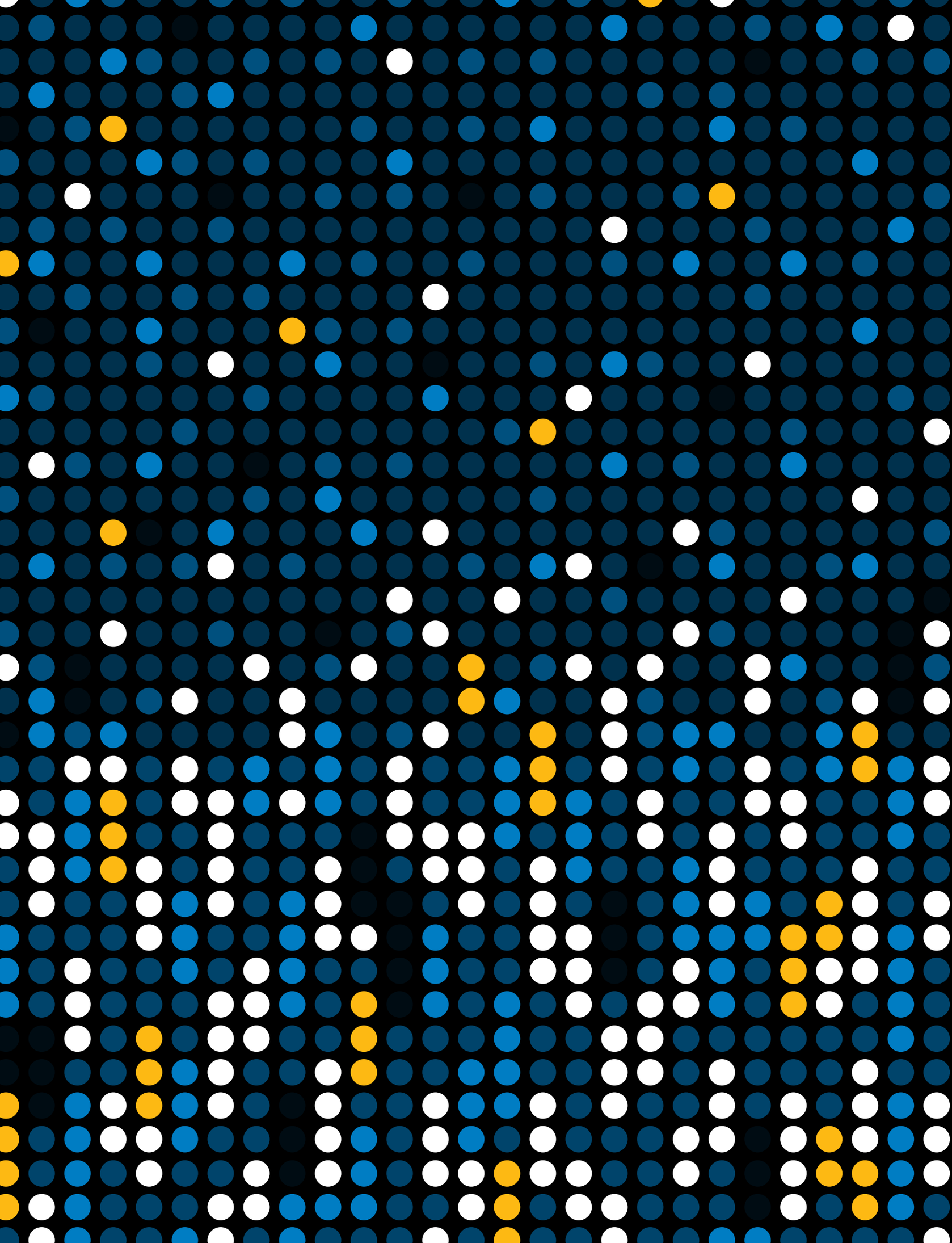
Services and Support

BD Biosciences is fully committed to the success and satisfaction of its customers. The BD FACSJazz cell sorter is backed by a world-class service and support organization with unmatched flow cytometry experience.

Training
Hands-on training is included with each BD FACSJazz cell sorter. BD flow cytometry courses combine theory and practice to provide participants with the skills and experience they need to take full advantage of the capabilities of their new cell sorter.

Technical Application Support
BD Biosciences technical application support specialists are available to provide field- or phone-based assistance and advice. Experts in a diverse array of topics, BD Technical Application Specialists are well equipped to address customer needs in both instrument and application support.

Field Service Engineers
When instrument installation or service is required, a BD Biosciences Technical Field Service Engineer can be dispatched to the customer site. BD Biosciences field service engineers are located across the world. On-site service and maintenance agreements are available to provide long-term support.



Regional Offices bdbiosciences.com/contact

Asia Pacific
Singapore
Tel 65.6861.0633
Fax 65.6860.1590
China
Tel 86.21.3210.4610
Fax 86.21.5292.5191
India
Tel 91.124.2383566
Fax 91.124.2383224/25/26
bd_india@bd.com

Australia/New Zealand
Australia
Toll Free 1800 656 100
Tel 61.2.8875.7000
Fax 61.2.8875.7200
bd_anz@bd.com
New Zealand
Toll Free 0800 572.468
Tel 64.9.574.2468
Fax 64.9.574.2469
bd_anz@bd.com

Canada
BD Biosciences
Tel 866.979.9408
Fax 888.229.9918
bdbiosciences.com/ca
canada@bd.com

Europe
BD Biosciences
Tel 32.2.400.98.95
Fax 32.2.401.70.94
bdbiosciences.com/eu
help.biosciences@europe.bd.com

Japan
Nippon Becton Dickinson
Toll Free 0120.8555.90
Tel 81.24.593.5405
Fax 81.24.593.5761

Latin America/Caribbean
BD Biosciences
Tel 55.11.5185.9995
Fax 55.11.5185.9895
biosciences.brasil@bd.com

United States
BD Biosciences
US Orders 855.236.2772
Technical Service 877.232.8995
Fax 800.325.9637
answers@bd.com
bdbiosciences.com

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BD Biosciences
2350 Qume Drive
San Jose, CA 95131
bdbiosciences.com

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